WHAT IS CLAIMED IS:

1. A bar-code reader that scans a bar code that is formed by black bars and white bars each having a width that is an integral multiple of a basic width, comprising:

a differential processing unit that calculates differential of a signal obtained by optically scanning the bar code to thereby obtain a differential data;

a peak detector that detects peaks in the differential data;

a peak-to-peak distance calculating unit that calculates peak-to-peak distances for all the peaks detected, the peak-to-peak distance being a distance between two adjacent peaks;

a frequency-mapping unit that calculates, for each of the peak-to-peak distances, candidate values for the basic width by dividing the corresponding one of the peak-to-peak distance by each of a plurality of integral numbers that are possible candidates for the integral numbers respectively;

a transition-route forming unit that selects, based on a predetermined criteria, a candidate value for the basic width corresponding to each of the peak-to-peak distances to thereby form a combination pattern for each candidate values of the basic width; and

an error judging unit that judges an mount of error in each of the combination patterns, and determines a combination pattern, as a candidate combination pattern, having least amount of error from among the combination patterns;

a basic-width determining unit that calculates the basic width

from the candidate values for the basic width in the candidate combination pattern.

2. The bar-code reader according to claim 1, wherein the predetermined criteria is to select a candidate value corresponding to a peak-to-peak distance in question such that the candidate value selected is nearest to a candidate value selected corresponding to a peak-to-peak distance that is adjacent to the peak-to-peak distance in question.

3. The bar-code reader according to claim 1, wherein the predetermined criteria is to select a candidate value corresponding to a peak-to-peak distance in question such that the candidate value selected is nearest to an average value of candidate values selected corresponding to a plurality of peak-to-peak distances that are adjacent to the peak-to-peak distance in question.

4. The bar-code reader according to claim 1, wherein the predetermined criteria is to judge whether an error with candidate values for the basic width that are selected from other group of candidate values of the basic group is within a threshold value and adopts a candidate value that is within the threshold value as an effective candidate value for the basic width.

5. The bar-code reader according to claim 4, wherein the error judging unit selects a combination pattern, from the combination patterns, as the candidate combination pattern, that include not less than a predetermined number of effective candidate values for the basic width.

6. The bar-code reader according to claim 1, wherein the frequency-mapping unit discards candidate values calculated that are not less than an upper threshold and that are not greater than a lower threshold.

7. The bar-code reader according to claim 1, wherein the frequency-mapping unit discards the possible candidates for the integral numbers that are not less than an upper threshold and that are not greater than a lower threshold.

8. The bar-code reader according to claim 1, wherein while forming the combination pattern the transition-route forming unit uses a single value of the candidate value for the basic width only in a single combination pattern.

9. The bar-code reader according to claim 1, wherein the transition-route forming unit forms on priority basis a combination pattern that includes a candidate value for the basic width when the multiple is 2.

10. A method of reading a bar code by scanning the bar code that is formed by black bars and white bars each having a width that is an integral multiple of a basic width, comprising:

calculating differential of a signal obtained by optically scanning the bar code to thereby obtain a differential data;

detecting peaks in the differential data;

calculating peak-to-peak distances for all the peaks detected, the peak-to-peak distance being a distance between two adjacent peaks;

calculating, for each of the peak-to-peak distances, candidate values for the basic width by dividing the corresponding one of the peak-to-peak distance by each of a plurality of integral numbers that are possible candidates for the integral numbers respectively;

selecting, based on a predetermined criteria, a candidate value for the basic width corresponding to each of the peak-to-peak distances to thereby form a combination pattern for each candidate values of the basic width;

judging an mount of error in each of the combination patterns, and determining a combination pattern, as a candidate combination pattern, having least amount of error from among the combination patterns;

calculating the basic width from the candidate values for the basic width in the candidate combination pattern.

11. The method according to claim 10, wherein the predetermined criteria is to select a candidate value corresponding to a peak-to-peak distance in question such that the candidate value selected is nearest to a candidate value selected corresponding to a peak-to-peak distance that is adjacent to the peak-to-peak distance in question.

12. The method according to claim 10, wherein the predetermined criteria is to select a candidate value corresponding to a peak-to-peak distance in question such that the candidate value selected is nearest to an average value of candidate values selected corresponding to a plurality of peak-to-peak distances that are adjacent to the peak-to-peak distance in question.

13. The method according to claim 10, wherein the predetermined criteria is to judge whether an error with candidate values for the basic width that are selected from other group of candidate values of the basic group is within a threshold value and adopts a candidate value that is within the threshold value as an effective candidate value for the basic width.